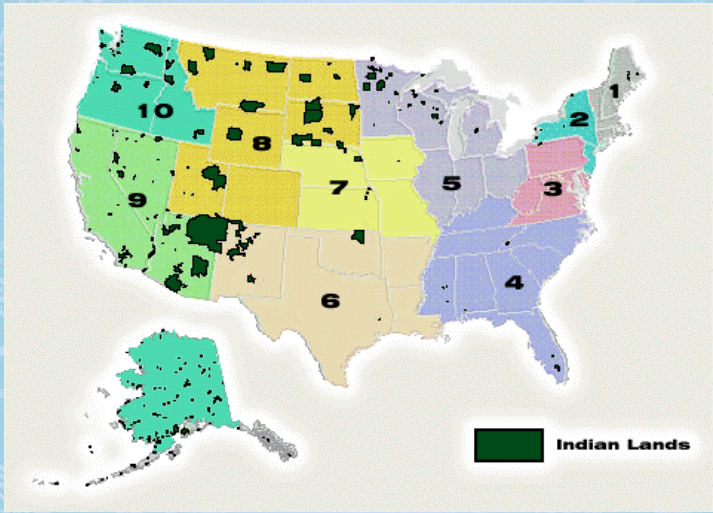
How to Write a Watershed Plan

A Framework for Action!



Elicia Blumberg
Tetra Tech

The Watershed Approach: What is it???

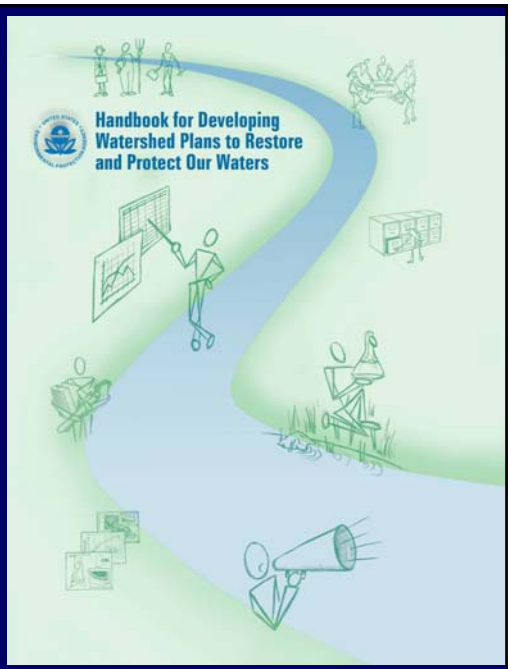
A framework…

1. Diverse, well integrated partnerships
2. A specific geographic focus
3. Actions based on sound science and technology
4. Coordinated priority setting and integrated solutions

The Watershed Approach: Why do it???

- It works (http://www.epa.gov/nps/success/)
- It will help you figure out what projects to submit for EPA funding
- It will make EPA happy!
- It will make you happy because your life will be easier down the road

Watershed Planning Handbook



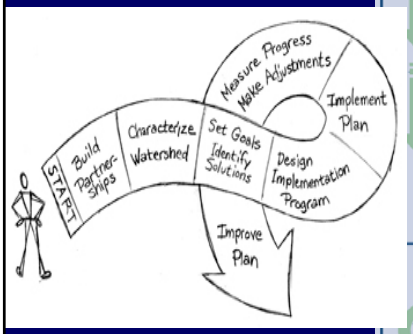
http://www.epa.gov/owow/nps/watershed_handbook/

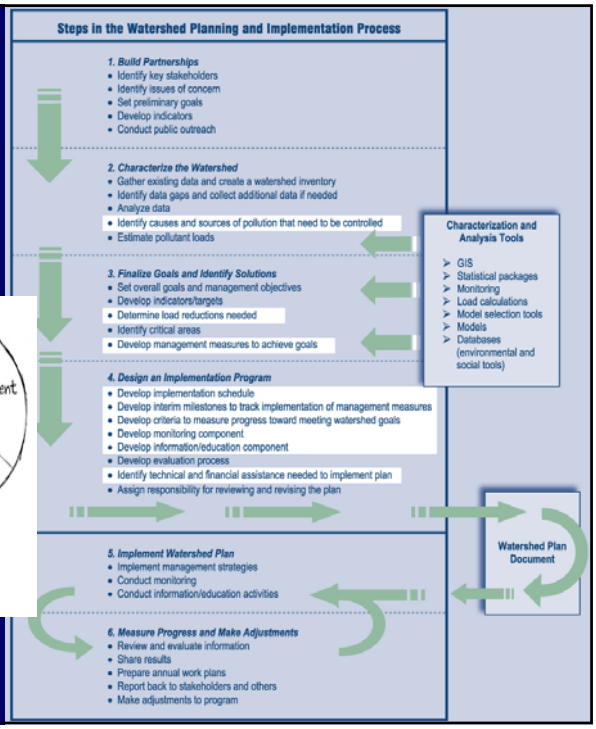
EPA's Nine Elements for Plans

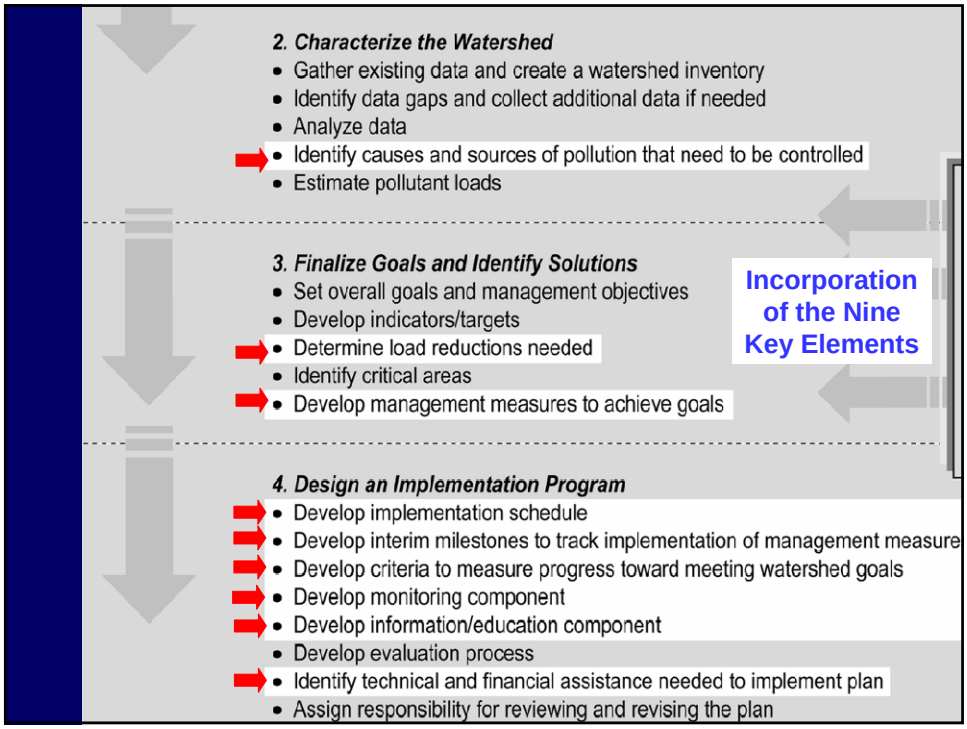
a. Causes & sources of pollution (sub-category level)
b. NPS management measures + identification of critical areas
c. Estimate of water quality-based goals to be achieved by (b)
d. Estimate technical and financial assistance needed
e. Public education component
f. Project implementation schedule
g. Interim, measurable milestones for (f)
h. Indicators to measure progress in achieving WQ goals (c)
i. Long-term monitoring component for (h)

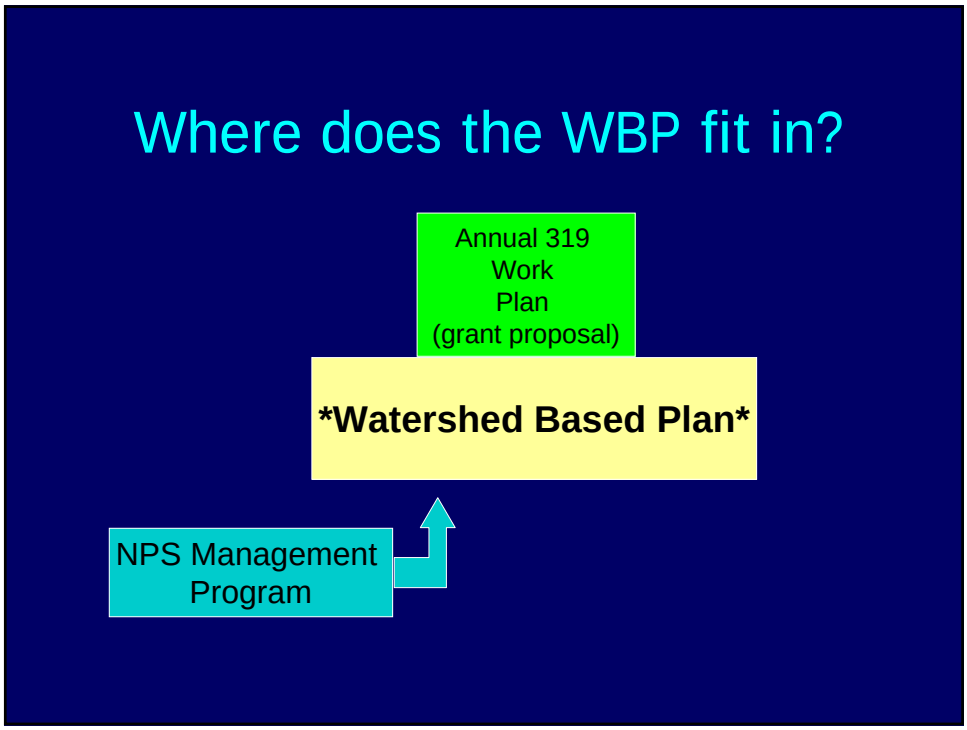
Reference: FY 2007 Tribal 319 Guidelines
www.epa.gov/owow/nps/tribal/pdf/fy07tribal319.pdf

Where do the 9 elements fit in?






2. Characterize the Watershed
Gather existing data and create a watershed inventory
Identify data gaps and collect additional data if needed
Analyze data
Identify causes and sources of pollution that need to be controlled
Estimate pollutant loads
3. Finalize Goals and Identify Solutions
Set overall goals and management objectives
Develop indicators/targets
Determine load reductions needed
Identify critical areas
Develop management measures to achieve goals
Incorporation of the Nine Key Elements
4. Design an Implementation Program
Develop implementation schedule
Develop interim milestones to track implementation of management measure
Develop criteria to measure progress toward meeting watershed goals
Develop monitoring component
Develop information/education component
Develop evaluation process
Identify technical and financial assistance needed to implement plan
Assign responsibility for reviewing and revising the plan


Where does the WBP fit in?
Annual 319 Work Plan (grant proposal)
Watershed Based Plan
NPS Management Program

Contents of a Watershed Plan

- Introduction
  - Plan area & description, partners, background
- Water quality information & analysis
  - WQ goals, monitoring/assessment results
  - Key pollutants / stressors, sources
- Proposed management measures
  - WQ improvements needed, BMP types proposed
  - Reductions expected from BMPs, installation sites
- Implementation plan
  - Public info/education & outreach/involvement plan
  - BMP/$$/TA support sources, project schedule & costs
- Monitoring and adaptive management approach
  - Interim measurable milestones
  - Monitoring plan & partners

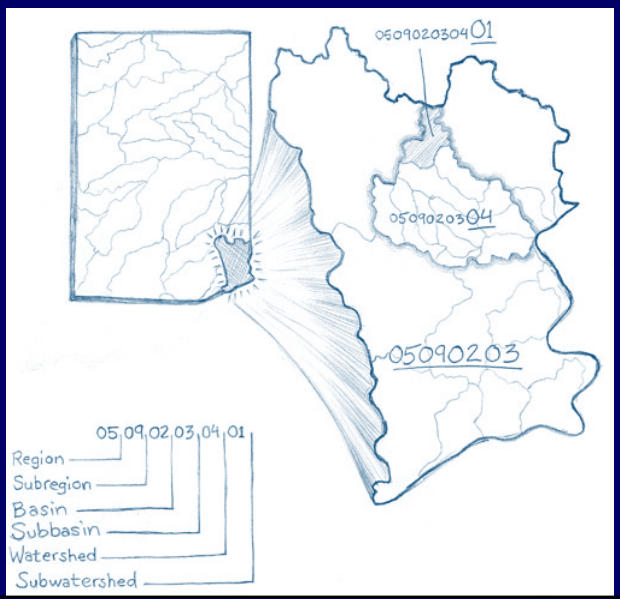
Stakeholder: Anyone who can help or hurt the process, or be helped or hurt by the process.

An information and education component (e)

- enhance public understanding
- encourage early and continued participation in selecting, designing, and implementing the NPS management measures.

How large a planning area?

"Small enough to manage but large enough to address WQ issues"



Identify the causes and sources of impairments (a).

- Identify sources at significant sub-category level
- Include estimates of extent to which they are present in the watershed.

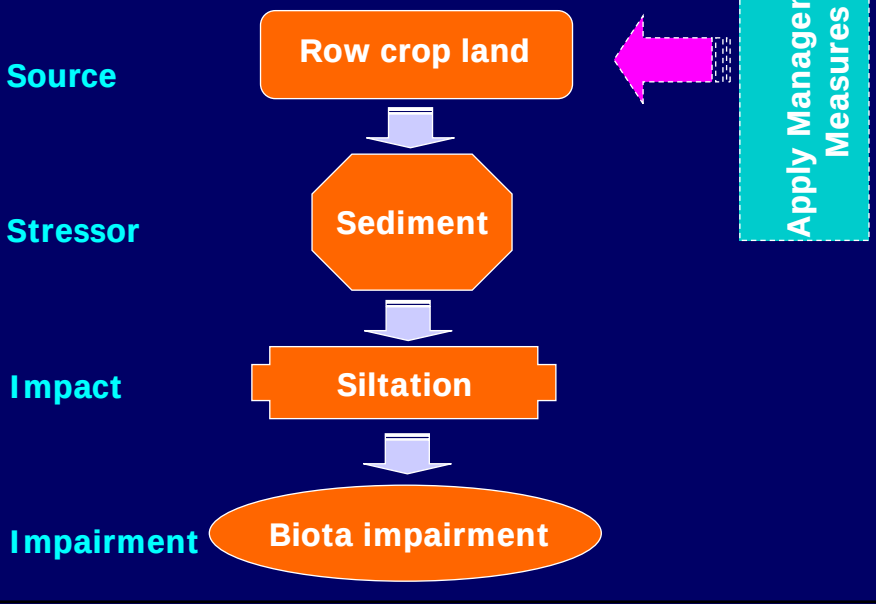
EXAMPLES

- *15 dairy feedlots needing upgrade*
- *100 acres of corn field needing nutrient management*
- *8 miles of eroded streambank to restore*

How to identify causes & sources?

Stressors	Sources
Sediment	Row crop land Timber harvest areas Eroding stream banks
Nutrients	Livestock feeding areas Fertilized cropland Septic systems
Bacteria	Livestock feeding areas Septic systems Geese & other wildlife

Simplified Conceptual Model



Data Types for Watershed Characterization

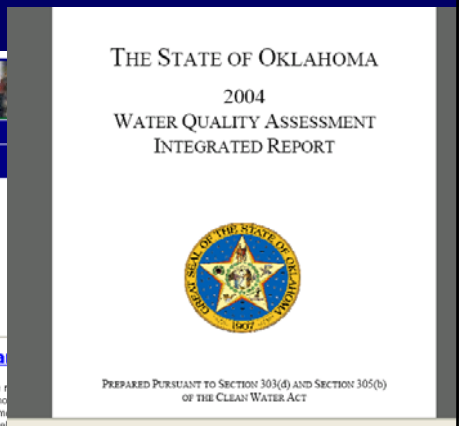
- **Physical and Natural Features**
  - Watershed boundaries
  - Hydrology
  - Topography
  - Soils
  - Climate
  - Habitat
  - Wildlife
- **Land Use and Population Characteristics**
  - Land use and land cover
  - Existing management practices
  - Demographics
- **Waterbody Conditions**
  - Water quality standards
  - 305(b) report
  - 303(d) list
  - TMDL reports
  - Source Water Protection Areas
- **Pollutant Sources**
  - Point sources
  - Nonpoint sources
- **Waterbody Monitoring Data**
  - Water quality data
  - Flow data
  - Biological data

Who has assessment data?

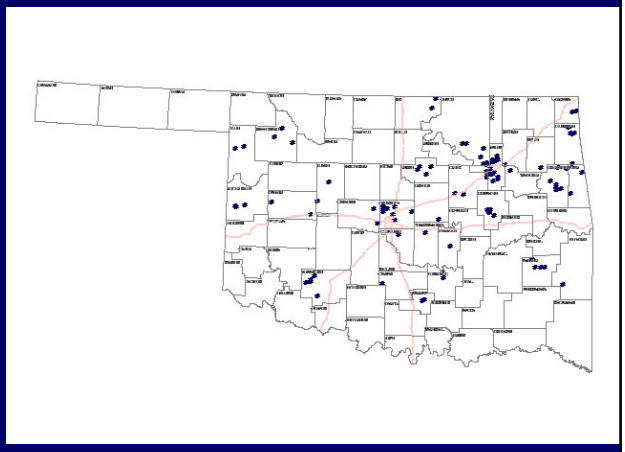
- Federal agencies
  - USGS, USFWS, USFS, BLM, USACE
- State agencies
  - Water, fish & game, forest, ag
- Colleges & universities
- Watershed groups
  - Volunteer monitoring programs, local knowledge
- Local agencies
  - Water/wastewater, health, planning and zoning, etc.
- Check out www.epa.gov/surf

What kind of data do they have?

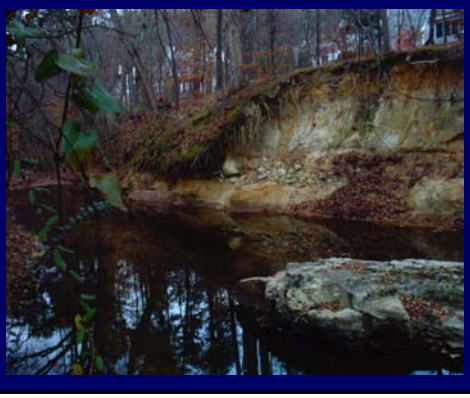
- Existing assessments and reports
- Preliminary GIS/Data Analysis (USGS)
- Input from resource professionals and stakeholders

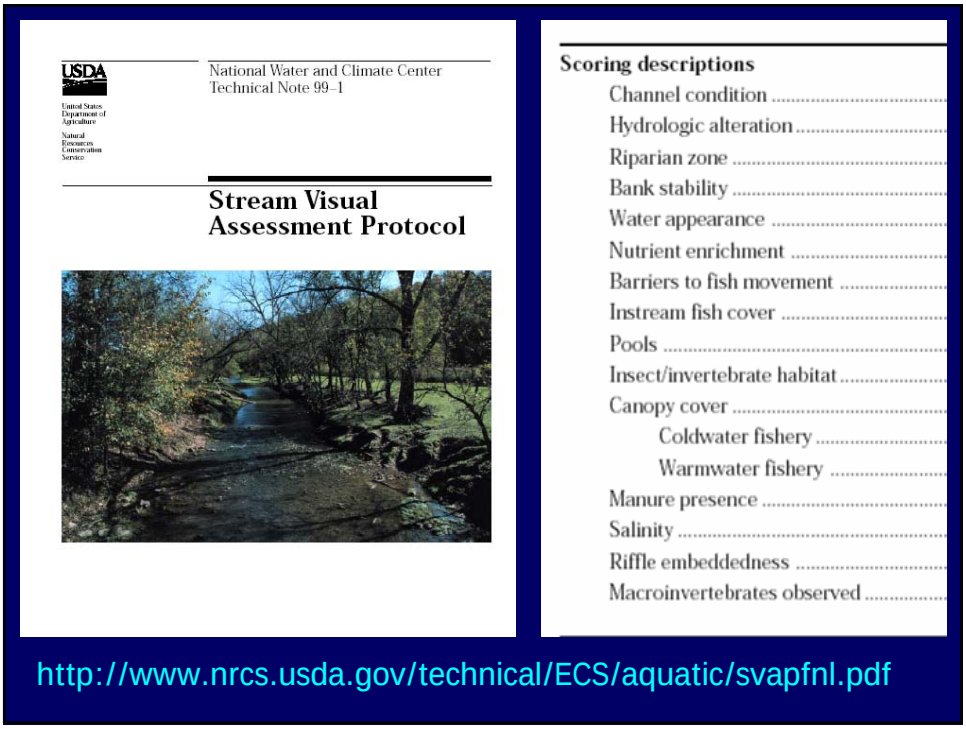


Kinds of Data, Continued…: Existing Biological Monitoring Data



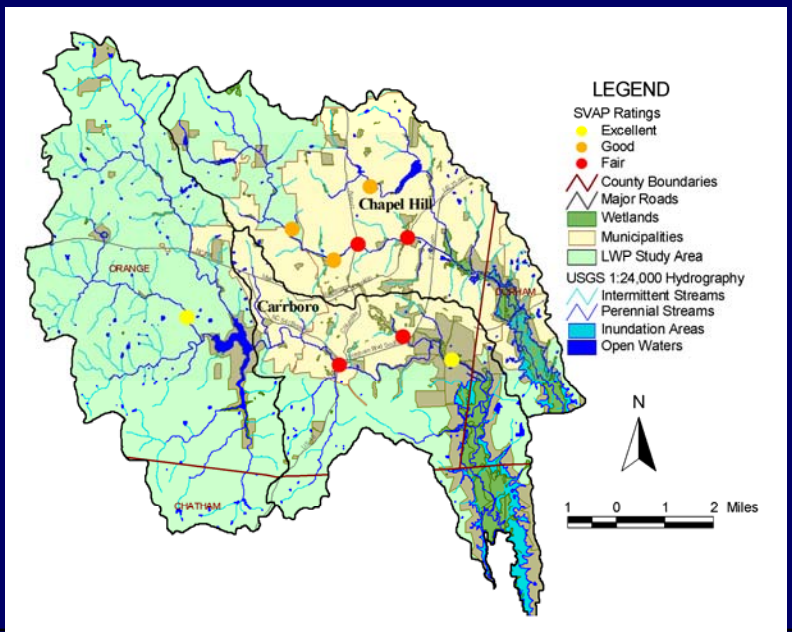
Stakeholder Perceptions



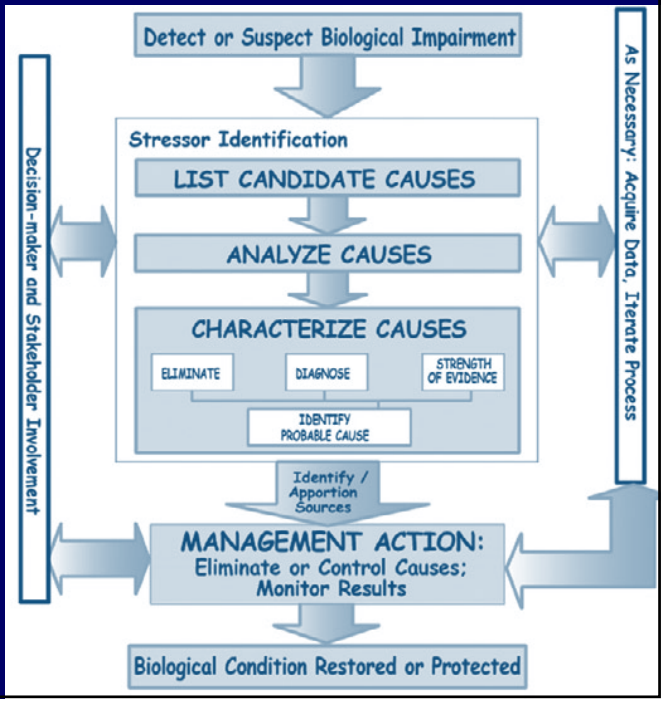


http://www.nrcs.usda.gov/technical/ECS/aquatic/svapfnl.pdf

Stream Visual Assessment



Stressor ID Process



A word on estimating loads

- Monitoring data
  - directly estimate the pollutant loading entering a waterbody
  - does not attribute loads to particular sources or areas
- Literature Values
  - simple but cannot account for variation
  - Pollutant load=land use*coefficient
- Models
  - sophisticated; can be used to forecast or estimate future conditions
  - require expertise
  - STEPL: http://it.tetratech-ffx.com/stepl/default.htm

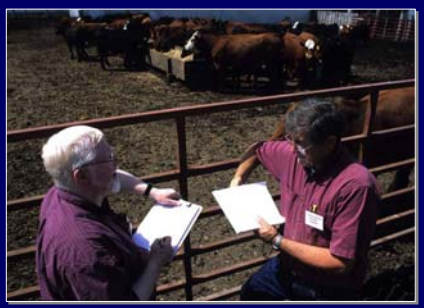
Estimate WQ goals (c):

Where are you now and where do you want to go?

Define your watershed goals:

- Meet water quality standards
- Improve measurable water quality conditions or parameters
- Enhance/restore fisheries
- Stabilize stream banks
- Restore ceremonial waters

Set Criteria (h) = Environmental Indicators, to Measure Achievement of WQ Goals



Factors to Consider When Selecting Indicators

Validity

- Is the indicator related to your goals and objectives?
- Is the indicator appropriate in terms of geographic and temporal scales?

Clarity

- Is the indicator simple and direct?
- Do the stakeholders agree on what will be measured?
- Are the methodologies consistent over time?

Practicality

- Are adequate data available for immediate use?
- Are there any constraints on data collection?

Clear Direction

- Does the indicator have clear action implications depending on whether the change is good or bad?

STRESSOR	MEASURABLE INDICATOR
SEDIMENT	TSS, TURBIDITY
EUTROPHICATION	CHLOROPHYLL A, NITRATE/ NITRITE/ TOTAL PHOSPOROUS/ NITROGEN, AMMONIA
PATHOGENS	FECAL COLIFORMS, E. COLI
METALS	COPPER, LEAD, ZINC
HABITAT	(TEMP, PHYSICAL HABITAT ASSESSED BY RAPID BIOASSESSMENT
GENERAL WATER QUALITY	TDS, CONDUCTIVITY, PH, OIL AND GREASE
FLOW	DRY WEATHER FLOW, PEAK FLOW, FLOOD EVENT FREQUENCY
BIOLOGY	DIVERSITY AND RICHNESS INDICES, BIOLOGICAL INDICES

Linkage Example

SOURCE/ STRESSOR =

excessive eutrophication of drinking water reservoir

INDICATOR (CRITERIA) =

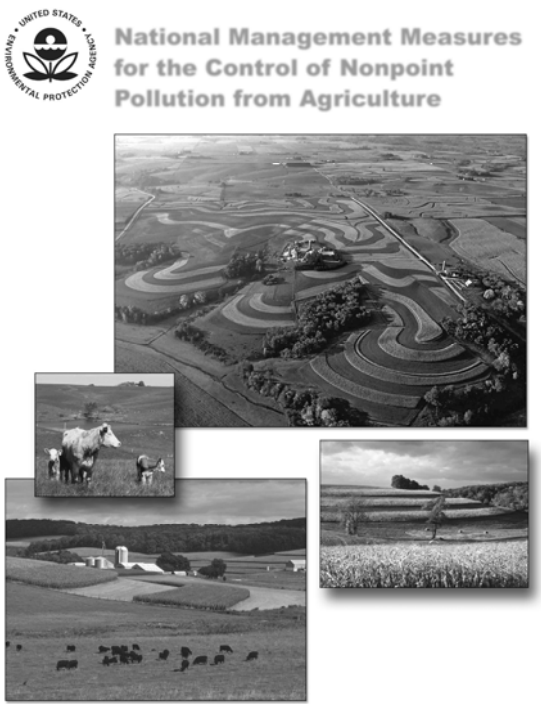
chlorophyll-a as a measure of algal productivity

WATER QUALITY GOAL =

maintain concentration of chlorophyll a $\leq$ 15 ug/L on a seasonal basis near the water supply intake

Develop management measures to achieve goals (b)

epa.gov/owow/nps/pubs.html

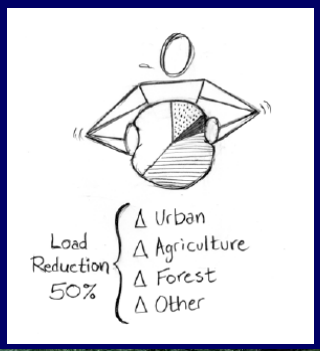


Description of the NPS management measures (BMPs) needed

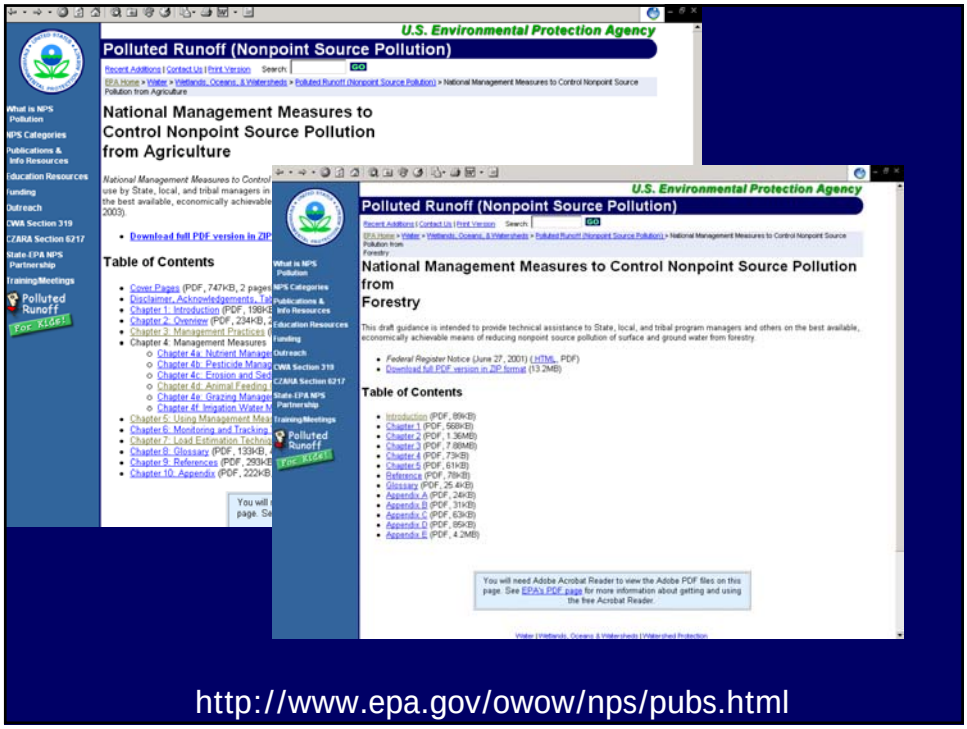
- Management measures or BMPs should be linked to (or otherwise address) stressors and sources
- Specify or map areas where BMPs will be used or installed

References for determining BMP effectiveness

- Stormwater/Urban (BMP Effectiveness database; Menu of BMPs)
- Agriculture (Ag Management Measure document)
- Forestry (Forestry Management Measures document)
- Mining (Development document for proposed Effluent Guideline for Mining)



www.epa.gov/nps



http://www.epa.gov/owow/nps/pubs.html

Sample BMP effectiveness table (ag)

Table 4d-6. Relative gross effectiveness[a] (load reduction) of animal feeding operation control measures (Pennsylvania State University, 1992b).

Practice[b] Category	Runoff Volume	Total[d] Phosphorus (%)	Total[d] Nitrogen (%)	Sediment (%)	Fecal Coliform (%)
Animal Waste Systems[e]	reduced	90	80	60	85
Diversion Systems[f]	reduced	70	45	NA	NA
Filter Strips[g]	reduced	85	NA	60	55
Terrace System	reduced	85	55	80	NA
Containment Structures[h]	reduced	60	65	70	90

NA = not available.
[a] Actual effectiveness depends on site-specific conditions. Values are not cumulative between practice categories.
[b] Each category includes several specific types of practices.
[d] Total phosphorus includes total and dissolved phosphorus; total nitrogen includes organic-N, ammonia-N, and nitrate-N.
[e] Includes methods for collecting, storing, and disposing of runoff and process-generated wastewater.
[f] Specific practices include diversion of uncontaminated water from confinement facilities.
[g] Includes all practices that reduce contaminant losses using vegetative control measures.
[h] Includes such practices as waste storage ponds, waste storage structures, waste treatment lagoons.

http://www.epa.gov/owow/nps/agmm/index.html

Sample BMP effectiveness table (urban)

Table 6-3. BMPs and removal efficiencies used in Site Evaluation Tool BMP percent efficiency

BMP	Percent Efficiency			
	TSS	Total Nitrogen	Total Phosphorus	Fecal Coliform
Wet pond	85 [d]	33 [a]	51 [a]	70 [a]
Dry detention	47 [a]	25 [a]	19 [a]	78 [a]
Stormwater wetland	76 [a]	30 [a]	49 [a]	78 [a]
Sand filter	87 [a]	32 [a]	59 [a]	37 [a]
Bioretention	87 [i,j]	57 [f,g,h]	76 [f,g,h,i]	90 [k]
Enhancedg Grass swale	93 [a]	92 [a]	83 [a]	- 25 [a]
Grass swale	68 [a]	20 [a]	29 [a]	5 [a]
Infiltration trench	95 [a]	51 [a]	70 [a]	90 [e]
25-ft forest buffer	57 [b,c]	27 [b,c]	34 [b,c]	5 [k]
50-ft forest buffer	62 [b,c]	31 [b,c]	38 [b,c]	5 [k]
75-ft forest buffer	65 [b,c]	33 [b,c]	41 [b,c]	5 [k]
100-ft forest buffer	67 [b,c]	34 [b,c]	43 [b,c]	5 [k]
200-ft forest buffer	72 [b,c]	38 [b,c]	47 [b,c]	5 [k]

[a] Winer, R. 2000. National Pollutant Removal Performance Database for Stormwater Treatment Practices, 2nd ed. Center for Watershed Protection, Ellicott City, MD.

Select best options

Describe NPS management measures needed to achieve pollutant reductions

- What is essential to achieving objectives?
- Which options are preferred by stakeholders?
- Which options have greatest chance for long-term success and sustainability?

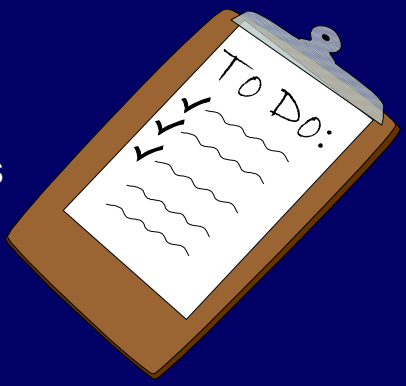
Asking the right questions . . .

- Who can help implement the BMPs or controls?
  - Agencies, businesses, non-profits, citizens, producers
- How can they be implemented?
  - What has been done in the past?
  - How well did it work?
  - Can we do it (or adapt it) here?
- When can we get started?
  - Reasonable short-term actions
  - Long-term or major actions
- How do we know if it's working?
  - And what do we do if it's not?

Develop a schedule (f) for implementing the NPS management measures that is reasonably expeditious.

Describe interim, measurable milestones (g)…

… for determining whether NPS management measures or other control actions are being implemented."



Example Milestones

- Short-term (<1 yr)
  - Achieve 5% reduction in sediment on 1,000 acres of ag land in the Cross Creek watershed by implementing rotational grazing practices.
- Mid-term (1-4 yrs)
  - Reduce streambank erosion and sediment rate by reestablishing vegetation along 3,600 feet of Cross Creek.
- Long-term (>5 yrs)
  - Install 4 stormwater detention ponds to reduce sedimentation by 50% into Falls lake.

Include a monitoring component (i) …

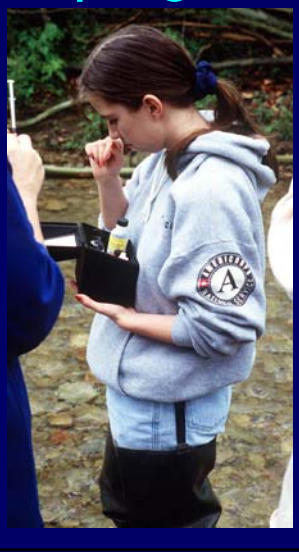
…to evaluate the effectiveness of the implementation efforts over time, measured against your criteria.

Estimate technical and financial assistance needed (d)

- Funding sources
  - Grants, contracts, donations
  - Supplemental Env. Projects
- Sources of technical assistance
  - Internal and external
  - Design/engineering services
  - Volunteer & other groups
- Regulatory or other authority
  - Health dept. planning/zoning
  - WHPP, SWPP, etc.
- Matching support sources
  - Outreach & education support
  - Be creative!

Coordinate with other water resource and land use programs

- Section 303, Water Quality Standards, TMDLs
- Section 319, NPS Program
- Section 402, NPDES Permits, CAFOs, Stormwater I & II
- Source Water Protection Plans – local water utilities
- Wetlands Protection Programs
- EQIP, CRP, BLM, USFS, USFWS
- More… helps to meet match



During implementation, remember:

- Plans are guides, not straitjackets
- Be aware of unforeseen opportunities
- Picking the low-hanging fruit is easy, but it helps to build a sense of progress & momentum
- If possible, work quietly for as long as you can on the most contentious issues

Make Adjustments!

- Monitor water quality and BMPs
  - Compare results to goals
  - Are you making progress?
  - Are you meeting your goals?
- If you aren't meeting implementation milestones . . .
- If you aren't making progress toward reducing pollutant loads....